Lab: Standing Waves on a String

I. DATA COLLECTION

- Hang diferent masses from the standing wave apparatus as demonstrated in class. When the mass is just right you should see a nodal pattern. Construct the following table

# of nodes	λ (m)	Mass (kg)
4		
5		
etc		

II. ANALYSIS

1. Using $v = \lambda f$ and the fact that the tension is $T = M\,g$, with $f = 120\,\mathrm{Hz}$ and $g = 9.8\,\mathrm{m/s}^2$, construct the following table

# of nodes	v^2 (m/s)	T (N)
4		
5		
etc		

2. Using the equation

$$v = \sqrt{\frac{T}{\mu}}$$

argue that if tension is on the y axis and v^2 is on the x axis the slope of this line should be the mass density μ.

3. Make a graph of T vs. v^2 using the plotting package. Perform a fit of this line to determine the slope – the intercept should be constrained to zero. The slope is a measurement of the mass density.

4. Measure the mass density μ directly by measuring the mass and length of a similar string:

$$M_{\text{string}} = \qquad\qquad L_{\text{string}} =$$

5. Determine the percent difference between part 3 and part 4.